

DETAILED ACTION

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1, 22 and 35-36 are rejected under 35 U.S.C. 102(b) as being anticipated by Holmes et al (US4323991).

With respect to claim 1 Holmes discloses a well bore system for producing seismic energy in an earth formation, comprising:

A cavity to be disposed in a well bore (pulser in figure 1, see figure 2); and a drive source(pump in figure 1) in fluid communication with the cavity, the drive source configured to inject fluid under pressure into the cavity to generate pressure waves in said cavity, the cavity producing seismic waves in the earth formation in response to the pressure waves, wherein the fluid circulates from the drive source (pump) to the cavity (pulser) and back to the drive source in a closed loop manner (see figure 1).

With respect to claim 22 Holmes discloses a method for producing seismic energy in an earth formation comprising:

Providing a cavity in a wellbore (see figure 1, element pulser, see also figure 2); injecting fluid under pressure into the cavity with a drive source (pump) to generate pressure pulses in the cavity such that the cavity produces seismic waves in an

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adjacent earth formation; and circulating the fluid from the drive source (pump) to the cavity (pulser) and back to the drive source in a closed loop manner (see figure 1).

With respect to claims 35 and 36 Holmes further discloses a fluid reservoir (suction pit in figure 1) and a pump (pump in figure 1) wherein the fluid circulates from the reservoir to pump and from the pump to the cavity (pulser).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 2-3,6-7, and 23-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Holmes (US 4323991) in view of Cloud (US2281751).

With respect to claim 2 Holmes discloses the invention as claimed except wherein said drive source is configured to generate pressure waves at a selected resonance frequency of said cavity.

With respect to claim 2 Cloud discloses wherein said drive source is configured to generate pressure waves at a selected resonance frequency of said cavity (Column 4 lines 27-69).

At the time of the invention it would have been obvious to one of ordinary skill in the art to combine the teachings of Cloud to generate the pressure waves at a resonant

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frequency of the cavity with the apparatus and method of Holmes to provide a more easily detectable seismic wave in the earth formation.

With respect to claim 3 Cloud further discloses wherein said drive source includes at least one of (i) a rotary valve, (ii) an electro-solenoid oscillator, and (iii) a pump (see figure 1 pump 26).

With respect to claim 6 Cloud does not disclose explicitly the use of sensors but their presence is implied by the detailed structure being for “seismic prospecting”. The teaching of seismic prospecting implicitly teaches sensors configured to record said produced seismic waves as prospecting requires some record.

With respect to claim 7 Cloud further discloses wherein said fluid is at least one of a liquid and a gas (described as water or other liquid column 7 line 70 – Column 8 line 8).

With respect to claims 22-24 the method steps are taught given the product structure.

3. Claims 9 and 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Holmes (US4323991) in view of Cloud (US2281751) and Stangroom (WO9750077).

With respect to claims 9 and 25 Holmes discloses the invention as claimed except wherein the fluid is a smart fluid.

Stangroom discloses the use of a smart fluid as the working fluid for an acoustic transducer.

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At the time of the invention it would have been obvious to one of ordinary skill in the art to combine the teachings of Stangroom to use smart fluids as the working fluid of an acoustic transducer along with the teachings of cloud to use a fluid as a means of activating an acoustic transducer, with the closed loop MWD system of Holmes.

The motivation for doing so would have been to reduce cost, space and weight of the system by allowing for the change of fluid parameter only requiring the electrical signal to be modulated (see Stangroom page 3 line 19- end of page 3).

4. Claims 10-13 and 26-28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Holmes (US4323991) in view of Cloud (US2281751) and Stangroom (WO9750077) as applied to claim 9 above and further in view of Wassel (US62577356).

With respect to claim 10 Holmes as modified discloses the invention as claimed except comprising at least one coil provided adjacent to said cavity, said coil is configured to provide an excitation for said smart fluid in said cavity when energized.

Wassel discloses the use of a coil (99 in figure 11) provided adjacent to a cavity, said coil providing an excitation for said smart fluid in said cavity when energized (See Column 6 lines 14-45).

With respect to claim 11 Wassel further discloses wherein an effective length of a smart fluid in a cavity can be controlled by selectively energizing said coil (Column 6 lines 14-45).

At the time of the invention it would have been obvious to one of ordinary skill in the art to combine the teachings of Wassel to use a coil and smart fluid to control the

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length of a fluid cavity with the teachings of Holmes as modified to control the length of a resonance cavity of a fluid acoustic source.

The motivation for doing so would be to reduce the number of components being physically moved to control the effective length of the resonance chamber.

With respect to claim 12 Wassel does not disclose expressly wherein the coil includes a plurality of segments which can be separately energized, it would have been obvious to one of ordinary skill in the art to provide segmented coils to allow for adjustable energizing, since it has been held that the provision of adjustability, where needed, involves only routine skill in the art. In re Stevens, 101 USPQ 284 (CCPA1954).

With respect to claim 13 Wassel further discloses wherein the coil is configured to provide an adjustable magnitude of intensity for said excitation field (Column 6 lines 35-45).

With respect to claims 26-28 Examiner considers the method steps to be necessitated by the product structure (refer to above rejection of claims 10-13).

5. Claims 14 and 29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Holmes (US4323991) in view of Cloud (US2281751), Stangroom (WO9750077) and Wassel (US6257356) as applied to claim 10 above, and further in view of Dedole (US4699240).

With respect to claims 14 and 29 Holmes as modified discloses the invention as claimed except further comprising a control unit operably coupled with one of said drive source and said coil.

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Dedole discloses a control unit operably coupled with one of said drive source and said coil (refer to figure 2, control unit coupled with drive source).

At the time of the invention it would have been obvious to one of ordinary skill in the art to combine the teachings of Dedole to include a control unit coupled with the drive source with the source of Holmes as modified to provide automated control of the frequency of the source.

6.Claims 15-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Holmes (US4323991)in view of Cloud(US2281751), Stangroom (WO9750077), Wassel (US6257356) and Dedole (US4699240) as applied to claim14 above, and further in view of Varsamis (US6366531).

With respect to claim 15 Holmes as modified discloses the invention as claimed except comprising at least one sensor connected to said control unit, said at least one sensor configured to measure a selected parameter of interest.

Varsamis discloses activating an acoustic drive source and a sensor connected to the control unit of the drive source, said sensor configured to measure a selected parameter of interest.(see figure 15, Column 9, Line 39 to Column 10, Line 60).

With respect to claim 16 Varsamis further discloses wherein said selected parameter of interest is selected from the group consisting of pressure, temperature seismic energy, flow rate, and frequency of pressure signals produced by said drive source (Column 9, Line 39 to Column 10, Line 60).

With respect to claim 17 Varsamis further discloses wherein said control unit is configured to adjust said drive source in response to a measurement provided by said at least one sensor.(see figure 15, Column 9, Line 39 to Column 10, Line 60).

At the time of the invention it would have been obvious to one of ordinary skill in the art to combine the teachings of Varsamis to have a sensor measure and the control module control the acoustic source according to the response of the sensor in order to maximize sampling efficiency.

7. Claims 18 and 32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Holmes (US4323991) in view of Cloud (US2281751)and Dedole (US4699240).

With respect to claims 18 and 32 Holmes as modified by Cloud (as discussed in above rejection of claim 2) discloses the invention as claimed except further comprising a control unit operably coupled with one of said drive source and said coil.

Dedole discloses a control unit operably coupled with one of said drive source and said coil (refer to figure 2, control unit coupled with drive source).

At the time of the invention it would have been obvious to one of ordinary skill in the art to combine the teachings of Dedole to include a control unit coupled with the drive source with the source of Holes as modified to provide automated control of the frequency of the source.

8. Claims 19-21 and 30-31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Holmes (US4323991),in view of Cloud (US2281751) Dedole

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(US4699240) as applied to claim 18 above, and further in view of Varsamis (US6366531).

With respect to claim 19 Holmes as modified discloses the invention as claimed except comprising at least one sensor connected to said control unit, said at least one sensor configured to measure a selected parameter of interest.

Varsamis discloses activating an acoustic drive source and a sensor connected to the control unit of the drive source, said sensor configured to measure a selected parameter of interest.(see figure 15, Column 9, Line 39 to Column 10, Line 60).

With respect to claim 20 Varsamis further discloses wherein said selected parameter of interest is selected from the group consisting of pressure, temperature seismic energy, flow rate, and frequency of pressure signals produced by said drive source (Column 9, Line 39 to Column 10, Line 60).

With respect to claim 21 Varsamis further discloses wherein said control unit is configured to adjust said drive source in response to a measurement provided by said at least one sensor.(see figure 15, Column 9, Line 39 to Column 10, Line 60).

At the time of the invention it would have been obvious to one of ordinary skill in the art to combine the teachings of Varsamis to have a sensor measure and the control module control the acoustic source according to the response of the sensor in order to maximize sampling efficiency.

With respect to claim 30 and 31 examiner considers the method steps to be necessitated by the product structure.

Response to Arguments

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Applicant's arguments with respect to claims 1-36 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to FORREST M. PHILLIPS whose telephone number is (571)272-9020. The examiner can normally be reached on Monday through Friday 8:30-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Elvin Enad can be reached on 57127221990. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/F. M. P./
Examiner, Art Unit 2832

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